



Customer No. 026418

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Docket No. GK-ZEI-3147 / 500343.20148

Applicant(s): Mario GERLACH, Martin WIECHMANN, Olaf KITTELMANN, Diegeo ZIMARE, Michael KEMPE Dirk MUEHLHOFF and Alexander KALIES

Application No.: 10/043,465 Group: 1398

Filed: January 10, 2002 Examiner:

For: MEDICAL LASER THERAPY DEVICE

SUBSTITUTE
SPECIFICATION
And
ABSTRACT

2005240 " 594E-100F

Patent Claims

Sub B1

B1

1. Medical laser therapy device comprising a controllable pump module with a coupling element for a waveguide, a beam control device in the form of a waveguide for supplying the pumping radiation delivered by the pump module to the applicator, and an applicator with a coupling element for the waveguide for introducing a target beam and/or treatment beam into the eye to be treated, characterized in that the pump module has laser diodes whose electromagnetic pumping radiation is in the spectral range from 800 nm to 815 nm, and in that an optics module is provided which couples the pumping radiation into the waveguide, in that the beam control device is an Nd-doped waveguide laser with a double core or single core and a suitable reflecting coating of the fiber end faces, wherein the waveguide forms a laser cavity with radiation in a frequency range between 1050 nm and 1070 nm, in that the applicator is a laser slit lamp with zoom system having a device for frequency doubling which preferably comprises nonlinear optical material or periodically poled nonlinear optical material, in that the applicator has a device for power monitoring, in that the applicator has a device for illuminating and observing the operating field, and in that the applicator has a target beam device whose radiation is coupled collinearly into the beam path for the therapy radiation by a suitable beamsplitter.

2. Laser therapy device according to claim 1, characterized in that the applicator is constructed as a head ophthalmoscope with a device for frequency doubling comprising a nonlinear optical material or periodically poled nonlinear optical material.

3. Laser therapy device according to claim 1, characterized in that the applicator is a laser link with a zoom system and has a device for frequency doubling which is made from nonlinear optical material or periodically poled nonlinear material, wherein this device is an internal or external part of the laser cavity.

205440 "5944001

4. Laser therapy device comprising a controllable pump module with a coupling element for a waveguide, a beam control device in the form of a waveguide for supplying the pumping radiation delivered by the pump module to the applicator, and an applicator with a coupling element for the waveguide for introducing a target beam and/or treatment beam into the eye to be treated, characterized in that the pump module has laser diodes whose electromagnetic pumping radiation is in the spectral range from 800 nm to 815 nm, and in that an optics module is provided which couples the pumping radiation into the waveguide, in that the pump module has a target beam device whose radiation is coupled into the beam path for the therapy radiation collinearly by a suitable beamsplitter, in that the beam control device is an Nd-doped waveguide laser with a double core or single core and suitable reflecting coating of the fiber end faces, wherein the waveguide forms a laser cavity with radiation in a frequency range between 1050 nm and 1070 nm, in that the applicator is a laser slit lamp with a zoom system which has a device for frequency doubling comprising nonlinear optical material or periodically poled nonlinear optical material, in that the applicator has a device for power monitoring, and in that the applicator has a device for illuminating and observing the operating field.

5. Laser therapy device according to claim 4, characterized in that the applicator is a head ophthalmoscope which has a device for frequency doubling preferably comprising nonlinear optical material which can also be periodically poled, wherein this device is an internal or external part of the laser cavity.

6. Laser therapy device according to claim 4, characterized in that the applicator is a laser link which has a zoom system and a device for frequency doubling preferably comprising nonlinear optical material which can also be periodically poled, wherein this device can be an internal or external part of the laser cavity.

205240" 594400T
10043455" 0442503

7. Laser therapy device for medical applications comprising a controllable pump module with a coupling element for a waveguide, a beam control device in the form of a waveguide for supplying the pumping radiation delivered by the pump module to the applicator, and an applicator with a coupling element for the waveguide for introducing a target beam and/or treatment beam into the eye to be treated, characterized in that the pump module comprises laser diodes whose electromagnetic pumping radiation is in the spectral range from 830 nm to 850 nm and in that an optics module is provided which couples the pumping radiation of the laser diodes into the waveguide, in that the beam control device is constructed as a Pr/Yb-doped waveguide with suitable reflecting coating of the fiber end faces, so that the waveguide forms a laser cavity for radiation in the frequency range between 520 nm and 540 nm or between 630 nm and 640 nm, depending on its technical design, in that the applicator is a laser slit lamp with a zoom system, comprises a device for monitoring power and a device for illuminating and observing the operating field, and in that the applicator has a target beam device whose radiation is coupled into the beam path for the therapy radiation collinearly by a beamsplitter.

8. Laser therapy device according to claim 7, characterized in that the applicator is a head ophthalmoscope.

9. Laser therapy device according to claim 7, characterized in that the applicator is a laser link with a zoom system.

10. Laser therapy device comprising a controllable pump module with a coupling element for a waveguide, a beam control device in the form of a waveguide for supplying the pumping radiation delivered by the pump module to the applicator, and an applicator with a coupling element for the waveguide for introducing a target beam and/or treatment beam into the eye to be treated, characterized in that the pump module comprises laser diodes whose electromagnetic pumping radiation is in the spectral range from 830 nm to 850 nm, and in that an optics module is provided which couples the radiation of the laser diodes into the waveguide, in that the beam control device is constructed as a Pr/Yb-

202510 " 594E4001

doped waveguide with suitable reflecting coating of the fiber end faces, so that the waveguide forms a laser cavity for radiation in the frequency range between 520 nm and 540 nm or between 630 nm and 640 nm, depending on its technical design, in that the applicator is a laser slit lamp with a zoom system, in that the applicator comprises a device for monitoring power and a device for illuminating and observing the operating field, and in that the pump module comprises a target beam device whose radiation is coupled into the beam path for the pumping radiation collinearly by a beamsplitter.

11. Laser therapy device according to claim 10, characterized in that the applicator is a head ophthalmoscope.

12. Laser therapy device according to claim 10, characterized in that the applicator is a laser link with zoom system.

13. Laser therapy device for medical applications comprising a controllable pump module with a coupling element for a waveguide, a beam control device in the form of a waveguide for supplying the pumping radiation delivered by the pump module to the applicator, and an applicator with a coupling element for the waveguide for introducing a target beam and/or treatment beam into the eye to be treated, characterized in that the pump module comprises laser diodes whose electromagnetic pumping radiation is in the spectral range from 970 nm to 980 nm, and in that an optics module is provided which couples the pumping radiation of the laser diodes into the fiber, in that the beam control device is constructed as an Er-doped waveguide with suitable reflecting coating of the waveguide end faces, so that the waveguide forms a laser cavity for radiation in the frequency range between 540 nm and 550 nm, in that the applicator is a laser slit lamp with a zoom system, in that the applicator comprises a device for monitoring power, in that the applicator comprises a device for illuminating and observing the operating field, and in that the applicator comprises a target beam device whose radiation is coupled into the beam path for the therapy radiation collinearly by a beamsplitter.

10043465.042502

14. Laser therapy device according to claim 13, characterized in that the applicator is a head ophthalmoscope.

15. Laser therapy device according to claim 13, characterized in that the applicator is a laser link with zoom system.

16. Laser therapy device comprising a controllable pump module with a coupling element for a waveguide, a beam control device in the form of a waveguide for supplying the pumping radiation delivered by the pump module to the applicator, and an applicator with a coupling element for the waveguide for introducing a target beam and/or treatment beam into the eye to be treated, characterized in that the pump module comprises laser diodes whose electromagnetic pumping radiation is in the spectral range from 970 nm to 980 nm and in that an optics module is provided which couples the pumping radiation of the laser diodes into the fiber, in that the beam control device is constructed as an Er-doped waveguide with suitable reflecting coating of the waveguide end faces, so that the waveguide forms a laser cavity for radiation in the frequency range between 540 nm and 550 nm, in that the applicator is a laser slit lamp with a zoom system, in that the applicator comprises a device for monitoring power, in that the applicator has a device for illuminating and observing the operating field, and in that the pump module comprises a target beam device whose radiation is coupled into the beam path for the pumping radiation collinearly by a suitable beamsplitter.

17. Laser therapy device according to claim 16, characterized in that the applicator is a head ophthalmoscope.

18. Laser therapy device according to claim 16, characterized in that the applicator is a laser link with zoom system.

19. Laser therapy device for medical applications comprising a controllable pump module with a coupling element for a waveguide, a beam control device in the form of a waveguide for supplying the pumping radiation delivered by

1604-3455-642502

the pump module to the applicator, and an applicator with a coupling element for the waveguide for introducing a target beam and/or treatment beam into the eye to be treated, characterized in that the pump module has laser diodes whose electromagnetic pumping radiation is in the spectral range from 800 nm to 815 nm, and in that an optics module is provided which couples the pumping radiation into the waveguide, in that the beam control device is a non-doped waveguide, possibly with antireflection-coated end faces, so that the pumping radiation is supplied to the applicator, in that the applicator is a laser slit lamp with zoom system which comprises a microchip laser for converting the pumping radiation into radiation in the green spectral range, in that the applicator has a device for monitoring power and a device for illuminating and observing the operating field, and in that the applicator has a target beam device whose radiation is coupled into the beam path for the therapy radiation collinearly by a beamsplitter.

20. Laser therapy device according to claim 19, characterized in that the applicator is a head ophthalmoscope which comprises a microchip laser for converting the pumping radiation into radiation in the green spectral range.

21. Laser therapy device according to claim 19, characterized in that the applicator is a laser link with a zoom system and with a microchip laser for converting the pumping radiation into radiation in the green spectral range.

22. Laser therapy device comprising a controllable pump module with a coupling element for a waveguide, a beam control device in the form of a waveguide for supplying the pumping radiation delivered by the pump module to the applicator, and an applicator with a coupling element for the waveguide for introducing a target beam and/or treatment beam into the eye to be treated, characterized in that the pump module comprises laser diodes whose electromagnetic pumping radiation is in the spectral range from 800 nm to 815 nm, and in that an optics module is provided which couples the pumping radiation into the waveguide, in that the beam control device is a non-doped waveguide, possibly with antireflection-coated end faces, so that the pumping radiation is supplied to the

100443465-042502

applicator, in that the applicator is a laser slit lamp with zoom system which comprises a microchip laser for converting the pumping radiation into radiation in the green spectral range, in that the applicator has a device for monitoring power and a device for illuminating and observing the operating field, in that the pump module has a target beam device whose radiation is coupled into the beam path for the pumping radiation collinearly by a suitable beamsplitter, in that the applicator is a laser slit lamp with zoom system which comprises a microchip laser for converting the pumping radiation into radiation in the green spectral range.

23. Laser therapy device according to claim 22, characterized in that the applicator is a head ophthalmoscope which comprises a microchip laser for converting the pumping radiation into radiation in the green spectral range.

24. Laser therapy device according to claim 22, characterized in that the applicator is a laser link with zoom system which comprises a microchip laser for converting the pumping radiation into radiation in the green spectral range.

25. Laser therapy device according to one of the preceding claims, characterized in that the pump module optionally comprises a measuring device for calibrating internal power regulation.

26. Laser therapy device according to one of the preceding claims, characterized in that the applicator is constructed as a handpiece for endoscopic or CPC applications.

add B2

10043465, 042502